International Lake Superior Board of Control

Semi-Annual Progress Report to the International Joint Commission

Covering the Period March 5, 2003 to September 15, 2003

1. Presque Ile Generating Station at the Mouth of the Dead River after the Silver Lake Dam Break. *Courtesy Edison Sault Electric Co.*

2. County Road 550 Bridge to Big Bay at Tourist Park.

3. Presque Ile Generating Station Switchyard after the Silver Lake Dam Break. *Courtesy Edison Sault Electric Co.*

4. House on the Dead River after the Silver Lake Dam Break.

Executive Summary

During the past six months, the Lake Superior and Lakes Michigan-Huron water levels remained well below average and near or below chart datum. Lake Superior levels were comparable to those in 2000, while Lakes Michigan-Huron levels were comparable to those in 2001. Shipping, recreation, and shoreline interests continued to be impacted as levels remained at or below chart datum throughout the upper lakes.

The Lake Superior outflows were as specified by Regulation Plan 1977-A, except for over-discharges in May and June to allow for emergency generation by Edison Sault Electric Company (ESEC) to provide electricity to help stabilize the power grid in Michigan's Upper Peninsula. This was necessary due to the Silver Lake Dam failure on 15 May (following heavy rains), and resulted in the shutdown of the Presque Isle Generating Station (the area's largest power producer), on the Dead River, near Marquette. Great Lakes Power Limited's (GLPL's) Clergue plant tripped out during the widespread blackout affecting much of the Northeastern U.S. and most of Ontario on 14 August 2003, but operations were quickly restored and no monthly under-discharge deviation was necessary. Neither emergency had a measurable impact on lake levels, but the levels of the St. Marys River were affected temporarily in both cases.

Since March, the monthly outflows from the upper lakes have been between 83 and 98% of the long-term average. Recent water supplies remained at or below long-term average, in general.

The Board's annual public meeting was held in Sault Ste. Marie, Ontario on 24 June, and was well attended. Although dry conditions prevailed, residents seemed generally content, although they would have preferred not to see levels decline any further.

The power entities conducted ponding operations (i.e., reduced outflows on weekends and holidays) during part of April, and in August. The Board suspended ponding for portions of April, May, and June, and the months of July and September, due to the projection that the water levels in the lower St. Marys River would be below chart datum. These suspensions effectively reduced any potential shipping delays that ponding operations might have otherwise created.

The automation of the U.S. Government hydropower plant was completed on 31 July. Testing is underway and is expected to be complete by the end of the year.

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International Lake Superior Board of Control

United States
BG (P) Steven R Hawkins, Member
John W. Kangas, Secretary

Canada
Carr McLeod, Member
Rob Caldwell, Secretary

15 September 2003

International Joint Commission
Ottawa, Ontario
Washington, D.C.

Commissioners:

This semi-annual report covers the Board's activities from 5 March to 15 September 2003.

1. Highlights

During the past six months, the Lake Superior and Lakes Michigan-Huron water levels remained below average, by about 20 cm (8 in.) and 40 cm (16 in.) or more, respectively. For much of the reporting period, Lake Superior levels were comparable to those in 2000, while Lakes Michigan-Huron levels were comparable to those in 2001. Compared to one year ago, Lake Superior's 2003 levels were about 10 cm (4 in.) lower, while those of Lakes Michigan-Huron were about 20 cm (8 in.) lower. Currently, Lake Superior is 27 cm (11 in.) below average and 13 cm (5 in.) lower than last year, while Lakes Michigan-Huron are 60 cm (24 in.) below average and 29 cm (11 in.) lower than this time in 2002. Shipping interests continued to be impacted as levels remained at or below chart datum throughout the upper lakes.

The Lake Superior outflows were as specified by Regulation Plan 1977-A during the past six months, except for over-discharges in May and June to allow for emergency generation by ESEC to provide electricity to help stabilize the power grid in Michigan's Upper Peninsula. This was necessary due to the Silver Lake Dam failure on 15 May due to heavy rains, which resulted in the shutdown of the Presque Isle Generating Station (the area's largest power producer), on the Dead River, near Marquette. GLPL's Clergue plant tripped out during the widespread blackout affecting much of the Northeastern U.S. and most of Ontario on 14 August 2003, but operations were quickly restored and no monthly under-discharge deviation was incurred as a result of this event. Neither emergency had a measurable impact on lake levels, but the levels of the St. Marys River were impacted temporarily in both cases.

Currently, the Lake Superior outflow is 2010 m3/s (71,000 cfs), as specified by Plan 1977-A. This outflow is 85% of normal.

The power entities conducted ponding operations during part of April and in August. At the

direction of the Board, ponding operations were suspended for portions of April, May, and June, and the months of July and September, due to the projection that the water levels in the lower St. Marys River would be below datum. This expectation was due to the low Lake Superior outflow and below-average water level conditions on the St. Marys River below Sault Ste. Marie.

On 24 June, the Board held a public meeting in Sault Ste. Marie, Ontario, which was well attended. Although the water levels on Lake Superior have been below average, area residents were generally content with the conditions, although would they prefer not to have levels decline any further.

From 12-15 August, the U.S. Army Corps of Engineers (Corps) and Environment Canada supported the Board in conducting flow measurements at the ESEC hydropower plant.

The automation of the U.S. Government hydropower plant was completed on 31 July. Testing is underway and is expected to be complete by the end of the year.

2. Monitoring of Hydrologic Conditions

The Board, through its staff, continuously monitors the water levels of Lakes Superior and Michigan-Huron, and the water levels and flows in the St. Marys River. The Regulation Representatives' monthly reports to the Board provide hydrologic assessments and recommendations on the regulation of outflows from Lake Superior. They also indicate the amount of water available for hydropower purposes, after the requirements for domestic use, navigation, and the fishery (St. Marys Rapids) are met.

Tables 1 and 2 list the recent monthly water levels, net basin supplies, and outflows for Lakes Superior and Michigan-Huron, respectively. Figure 1 compares the monthly water levels for this period to long-term averages and extremes. Figure 2 shows the monthly precipitation over the Lake Superior and Lakes Michigan-Huron basins. Figure 3 shows the monthly net basin supplies for the basins.

Apart from June, precipitation over the Lake Superior basin was above average for the past six months. The net basin water supplies, which are the net effect of precipitation, evaporation and runoff to the lake, were close to average in April, May, and July, but high in March, and very low in June and August. Lake Superior's levels were below chart datum (183.2 m or 601.1 ft.) until 20 May this year, but have since remained slightly above chart datum. Lake levels of the past six months were generally 20 cm (8 in.) below average. On 15 September, its level was at elevation 183.29 m (601.35 ft.), which was 27 cm (11 in.) below average and 13 cm (5 in.) lower than last year.

The precipitation pattern on the Lakes Michigan-Huron basin was near average in March and April, wet in May and July, and on the dry side in June and August. With the exception of May and July, the Lakes Michigan-Huron net total water supplies (which include the inflows from Lake Superior) have been below average so far this year. Lakes Michigan-Huron levels were

below chart datum (176.00 m or 577.4 ft.) until 11 June but then rose slightly above up until 28 August, and have since remained just below chart datum. The monthly mean water levels of the past six months were about 40 cm (16 in.) or more below average. On 15 September, Lakes Michigan-Huron were at elevation 175.94 m (577.23 ft.), which is 60 cm (24 in.) below average and 29 cm (11 in.) lower than one year ago.

3. Regulation of the Outflow from Lake Superior

The Lake Superior outflows were as specified by Regulation Plan 1977-A during the past six months, except for over-discharges in May and June to allow for emergency generation by ESEC to provide electricity to help stabilize the power grid in Michigan's Upper Peninsula. This was necessary following the Silver Lake Dam failure on 15 May due to heavy rains, which resulted in the shutdown of the Presque Isle Generating Station (the area's largest power producer), on the Dead River, near Marquette. When the Silver Lake earthen structure breached, the Presque Isle hydropower plant, located ~30 km (~20 miles) downstream, was flooded, and suffered damage from silt and debris. The result was that ESEC was asked to run at capacity around the clock starting on 19 May.

In keeping with the Boundary Waters Treaty of 1909 between the United States and Canada and the 1914 Orders of Approval as amended, GLPL's Clergue plant, the sole Canadian hydropower plant on the St. Marys River, was authorized by the Board to over-discharge at an equivalent rate, starting 28 May. The result was that both plants were then running at capacity. Due to this emergency situation, ponding restrictions that had been imposed at the beginning of May were waived for the remainder of the month. Given an expedited cleanup and quick return to service of the Presque Isle plant, both plants at Sault Ste. Marie were able to return to a schedule that followed their Plan-specified allotments on 21 June.

The small over-discharges resulting from this power emergency equated to deviations from Plan 1977-A of about 50 m^3/s (1,800 cfs) in May and about 80 m^3/s (2,800 cfs) in June (increases of approximately 3 and 4% in the monthly mean outflows, respectively). Therefore, they had no measurable impacts on the water levels of Lakes Superior and Michigan-Huron. Further, shipping and other interests were able to benefit from a slight, sustained increase in water levels along the lower St. Marys River during this period of increased Lake Superior outflows. The Commission approved these deviations from the Regulation Plan outflow by letter dated 3 June 2003.

During the large-scale blackout affecting much of the Northeastern U.S. and most of Ontario, GLPL's Clergue plant suffered a short-term shutdown starting at 1511 hrs. on 14 August 2003. Units 1, 2, and 3 were returned to service at 2029, 2341, and 2319 hrs., respectively the same day. ESEC and USGP were unaffected by the widespread power outages, and continued to operate normally during the crisis. GLPL endeavoured to run at capacity for the balance of the month, and was able to meet their monthly allotment. Therefore, no monthly under-discharge deviation was incurred as a result of this event. GLPL reacted quickly to the emergency, and kept in close contact with the Canadian Secretary of the Board following the incident. Parks

Canada and GLPL officials are now working to develop an automated, audible alarm at the dam to warn the Canadian lockmaster during future plant shutdowns, to prevent damage to the Canadian lock. Such shutdowns can result in large surges of water entering the upper lock channel and overtopping the upstream gates and lock wall, as well as a rapid drop in levels at the lower gates.

On 30 August, Lake Superior Power, which owns the 115 KV underwater power cables in the intake canal of the GLPL plant, carried out an annual cable inspection. To facilitate this dive, GLPL shut down all three units for about eleven hours on that day, resulting in about a 47 % reduction in the St. Marys River flow at Sault Ste. Marie. The water level at the U.S. Slip gauge just downstream of the locks declined sharply, by about 24 cm (9 in.), and recovered quickly following the shutdown. U.S. Slip levels remained below chart datum during the flow reduction, but there were no reports of ship delays as a result. A request will be made again to the Board in 2004 to complete a similar annual inspection and shutdown.

Gate 1 at the Compensating Works, which supplies water to the Fishery Remedial Works, remained at its normal flow setting of 15 m^3/s (530 cfs) throughout the past six months.

4. Governing Conditions During the Reporting Period

The monthly mean levels of Lake Superior ranged between 183.01 and 183.30 m (600.4 and 601.4 ft.) during the reporting period, well within the limits of 182.76 and 183.86 m (599.6 and 603.2 feet) specified in the Commission's Orders of Approval.

During the reporting period, the daily mean water levels in the lower St. Marys River at the U.S. Slip gauge downstream of the U.S. Locks, varied between 176.06 and 176.44 m (577.6 and 578.9 ft). Therefore, the requirement for maintaining the level below 177.94 m (583.8 feet) was satisfied.

5. Repairs, Inspection, and Flow Calibration at the Compensating Works

The Corps and Environment Canada postponed their program to conduct flow measurements to update the flow rating for the structure since levels and flows experienced during the summer of 2003 were similar to those during previous measurements. It is hoped that flow measurements can be performed in the summer of 2004 that encompass a different hydraulic regime.

Only routine maintenance and inspections of the Compensating Works were undertaken in the past six months. A large submerged timber was found to be blocking a portion of Gate 10 in June, and was quickly removed.

6. Repairs, Maintenance, and Flow Determination at the Hydropower Facilities

a. U.S. Government Hydropower Plant

The automation of the U.S. Government hydropower plant was completed on 31 July with the return to service of all five generating units. Final testing is underway and should be completed by the end of this year. This automation required (starting on 10 June 2002) shutting down one or two units at a time so as to minimize the impact on water diversion. The work included replacing the existing analog meters with digital instrumentation to continuously record, and to give readings of instantaneous power production and instantaneous plant operating head. It also included replacing the existing rotating exciters with solid-state exciters.

The new System Control and Data Acquisition (SCADA) system is in place and installation is substantially complete. Program adjustments to the software are required and should be complete in about six months as testing progresses. Acres International has completed a series of flow measurements on these units. Unit 10 modifications and testing should be completed by the end of September. Once it is online, Acres can complete flow measurements and develop new rating tables correlating actual water flow with turbine gate opening, the power generated, and plant head. These data are required to provide input parameters to the SCADA system.

Flow verification measurements will then be made by the Board to assure that the under-reporting problem has been corrected.

b. Great Lakes Power Limited

There were no significant repairs during the reporting period.

c. Edison Sault Electric Company

From 12-15 August, the Corps and Environment Canada conducted flow measurements in the power canal of the ESEC plant. Data is being analyzed and a report outlining the results is expected by the end of the year.

7. Water Usage in the St. Marys River

Table 3 (Table 4 in U.S. Customary units) lists the distribution of outflows from Lake Superior for January 2002-August 2003. Water uses are divided into four categories: domestic, navigation, fishery, and hydropower. According to the 1979 Supplementary Order, after the first three water requirements are satisfied, the remaining outflow is shared equally between the U.S. and Canada for hydropower purposes. Any remainder, beyond the flow capacity of the hydropower plants, is discharged through the Compensating Works and the St. Marys Rapids.

As shown in the tables, water used for domestic purposes is typically 4 m^3/s (140 cfs). The flow through the locks depends on traffic volume and varies from 2 to 18 m^3/s (70 to 640 cfs).

In accordance with the Commission's Orders to fulfill the fishery needs in the main rapids, a minimum gate setting of one-half gate open is required at all times at the Compensating Works. In addition, a flow of at least 15 m^3/s (530 cfs) is required in the Fishery Remedial Works (through Gate 1). A setting equivalent to one-half gate open for the main rapids was maintained by having four gates partially open to supply the same quantity of water as one gate half-open. This spreads the flow more evenly across the main rapids, and is less hazardous for upstream boaters who might accidentally drift into the structure. Gate No. 1 remained set at 15 m^3/s (530 cfs), meeting the requirements of the Orders.

8. Peaking and Ponding Operations at Hydropower Plants

Flow variations at the hydropower plants at Sault Ste. Marie cause downstream water level fluctuations. With the water levels and Lake Superior outflows below average, the fluctuations have become a subject of concern for commercial navigation users.

At the request of the Commission, the Board reviewed peaking and ponding operations at the hydropower plants, and submitted an update report to the Commission on 13 December 2002. The report recommended extension of the authority for peaking and ponding operations for one more year under guidelines proposed by the Board. One of the guidelines specifies that ponding operations be restricted if sustained weekend levels at the U.S. Slip Gauge are expected to be below chart datum elevation.

In the only response submitted following December's update report, ESEC and GLPL prepared a joint submission dated 13 February 2003, requesting that the extension be for multiple years. Furthermore, they suggested that restrictions on (peaking and) ponding be eliminated, since it was argued that no benefits to shipping (and other) interests had been shown during restrictions imposed during 2002 operations. At the 4 March Board meeting in Chicago, IL, ESEC's President, Mr. Don Sawruk, requested that the Board review conditions weekly or bi-weekly. The Board agreed to review monthly decisions regarding ponding restrictions at mid-month.

On 17 March 2003, the IJC re-authorized peaking and ponding until 20 March 2004, subject to the prior approval of the Board at the beginning of each month. The Regulation Representatives undertook mid-month reviews of each approval, as requested.

During the reporting period, the power entities undertook peaking and ponding operations under the supervision of the Board. Ponding operations were suspended for portions of April, May, and June, and all of July and September 2003, due to the low levels at U.S. Slip caused by a combination of low flow in the St. Marys River and the low water level conditions on Lake Huron.

As requested by the Commission by letter dated 17 March 2003, the Board will submit a written report by 23 January 2004.

To provide timely information to users, the Corps continues to distribute notices on expected Lake Superior outflows, and schedules of flow variations at the hydropower plants. The notices also contain contact information for mariners wishing to obtain additional information related to water levels and flows.

9. Long Lac and Ogoki Diversions

Ontario Power Generation (OPG) continued to provide the Board with information on the operations of the Long Lac and Ogoki Diversions. The Ogoki Diversion into Lake Nipigon (which flows into Lake Superior) averaged 81.0 m^3/s (2,900 cfs) from March through August 2003. The Long Lac Diversion into Lake Superior averaged 35.5 m^3/s (1,250 cfs) for the same period. Combined, these diversions were about 69 percent of average for the period 1944-2002, and accounted for approximately 3.8% of the total net basin water supply to Lake Superior.

It is important to note that the above values are reported every six months by OPG, in March and September. The Board uses long-term average diversion inflow values in the interim to make month-to-month supply estimates. The average monthly difference between the long-term average values and those reported was 8 m^3/s (280 cfs). Differences affect only reported supply estimates and do not impact directly on regulatory computations.

During the reporting period, no water was spilled northward into the Ogoki River.

Since May 1999, a continuous flow of at least 2 m^3/s (70 cfs) is maintained during the summer (mid-May through about Labour Day) from the north outlet of Long Lake. This agreement between OPG and the local First Nations provides water for environmental enhancement of the Kenogami River, and reduces the amount diverted to Lake Superior. There was no need to spill any additional water northward from Long Lake during the reporting period.

10. Annual Meeting with the Public and Public Information

The Board held its annual meeting with the public on 24 June in Sault Ste. Marie, Ontario. About 30 people were in attendance, including Board and IJC representatives, members of the public, and the media. The attendees were generally content with the current low levels on Lake Superior and downstream areas, but preferred that the levels not decline any further. There were requests that the Commission and the Board provide increased public participation and timely information about the proposed study to review Lake Superior outflow regulation. There were also concerns expressed regarding poor water quality in the North Channel of the St. Marys River (in Lake George and Echo Bay) during such periods of low water levels.

The Board continues to issue, at the beginning of each month, news releases informing the public about Lake Superior regulation and water level conditions. Announcements were made to caution visitors and anglers about water level and flow changes in the St. Marys Rapids during the cable inspection in the GLPL intake canal.

In support of the Board and the Commission, the Detroit District Corps of Engineers maintains a Board web site. It includes information on the Board and its activities, news releases, and updates on Great Lakes basin conditions.

11. U.S. Navigation Improvements and Studies

a. Vidal Shoals Dredging and Little Rapids Dredging

The previously reported dredging of the Vidal Shoals in the upper St. Marys River began in June, 2001 following approval from the U.S. State Department, which had consulted with Canada's Department of Foreign Affairs and International Trade (DFAIT). This dredging project consisted of deepening and modifying widths in existing channels in the Upper St. Marys River between Pointe Louise Turn and the South Channel portion to the navigation locks, upstream of Sault Ste. Marie. Dredging in the Point aux Pins area (about 8 km (5 miles) upstream of the locks) is complete. The West Approach area dredging will be completed by October. Dredging continues in the Vidal Shoals, between Point aux Pins and the West Approach, and should be completed by mid-October pending resolution of a dispute between the contractor and the Corps over dredging of the North Channel portion area.

The Corps is dredging approximately 76,500 m^3 (100,000 cubic yards) of material from the Lower St. Marys River navigation channel extending from the south approach of the Soo Locks to the northern end of the Rock Cut on the west side of Neebish Island. The required depth will be 8.7 m (28.5 ft.) below low water datum with an allowable shoal tolerance of 0.09 m (0.3 ft.). This work will be entirely in U.S. waters. The State Department and DFAIT indicated they had no objection to the project provided that it does not cause any trans-boundary impact on water levels and flows.

The environmental assessment process was completed with the signing of a "Finding of No Significant Impact" on 30 September 2002. Proposals for doing this dredging contract were opened 28 January 2003 and the contract was awarded (on 26 February 2003) for $1.9 million to MCM Marine. Work started in July and should be completed by October.

The 2-dimensional hydraulic model analysis has been coordinated with Environment Canada and they have agreed with the result of no net impact. A letter is to be sent confirming this.

b. Great Lakes – St. Lawrence Seaway Review

In 1999, the U.S. Congress authorized the Corps to review the feasibility of improving commercial navigation on the Great Lakes – St. Lawrence Seaway system, including locks, dams, harbours, ports, channels and other related features. This review is also in accordance with Section 456 of the Water Resources Development Act of 1999. The first phase of the review, a reconnaissance study, was completed in the summer of 2002. Possible improvements for navigation include deepening Great Lakes connecting channels, the St. Lawrence Seaway and specific ports, and reconstruction of locks on the system.

The results from the reconnaissance review indicated that both reliability and adequacy of the existing system present problems and opportunities. On 27 June 2002, the Corps' Detroit District office submitted its report to Headquarters for review and approval. Though this report was officially approved on 13 February 2003, Headquarters asked for a supplemental report that is to include a more extensive baseline environmental, economic, and engineering analysis. This supplemental report is expected to take two to three years to complete. Public review and comment is also required prior to the start of a feasibility study.

The Corps held preliminary discussions with Transport Canada officials regarding partnering for any future feasibility study. Transport Canada is currently assessing several strategies to determine future infrastructure requirements.

The Board will continue to update the Commission on the progress of this review.

c. Lock Replacement at Sault Ste. Marie, Michigan

The U.S. Congress initially authorized the construction of a new lock at Sault Ste. Marie, Michigan, to provide more efficient movement of waterborne commerce, in 1986, with continuation of authorization in 1990 and 1996. The Corps is currently reviewing the economic justification of replacing two technologically obsolete locks (Davis and Sabin Locks) with one modern lock. A Limited Reevaluation Report, including an economic/cost analysis, will be submitted to Headquarters for review and approval by the end of 2003. A Project Cooperation Agreement with the Great Lakes Commission is still being negotiated. The dewatering cofferdam design is complete. Lock design is expected to start pending availability of funds. Completion is expected to take six years from start of construction.

The Board will continue to update the Commission on the progress of this project.

12. Sea Lamprey Control

By letter dated 17 June 2002, the Great Lakes Fishery Commission (GLFC) requested the Board's assistance in carrying out a sea lamprey trapping experiment immediately below the ice spillway at the GLPL hydropower plant. The experiment did not take place following GLPL's decision not to proceed due to operational considerations.

To explore other alternatives where the Board could be of help, the Board invited biologists and fisheries experts from the GLFC and the Sea Lamprey Control Centre (SLCC) in Canada to its 17 September 2002 meeting. Conflicting obligations made their attending the meeting impossible. By letter dated 16 September 2002, GLFC informed the Board that there would be no further request for flow adjustments that year, and that GLFC looked forward to meeting with the Board at the March 2003 meeting to explore options for their 2003 field season.

At the March 2003 meeting, Mr. Gavin Christie of GLFC presented model results, control

methodologies, field observations, and critical control points in the system. Mr. Christie noted that future requests for potential attractant water for traps are unlikely, since pumps have shown promise for this purpose. He noted that the GLPL tailrace is ideal for trapping due to the normally high flowrates present there, which the eels are attracted to. It is also unlikely that future requests would be made to the Board to control Lake Superior outflows for lampricide applications.

13. Board Membership and Meetings

There was no change in the Board membership during the reporting period. U.S. Alternate Member, Colonel Mark Roncoli, acted on behalf of U.S. Member, BG (P) Steven R. Hawkins, while he was on active duty in Iraq until 7 July. In turn, Col. Gary Johnston was appointed by the Commission to replace Col. Roncoli effective 9 July. BG (P) Hawkins returned from Iraq and resumed acting as the U. S. Member with Col. Johnston as the Alternate Member at this time. BG (P) Hawkins returned to Iraq today, 15 September 2003.

Mr. Rob Caldwell replaced Mr. David Fay as the Canadian Secretary for an interim period (22 April 2003 through 14 October 2003) while Mr. Fay completes French training. Dr. Syed Moin replaced Mr. David Fay as the Canadian Regulation Representative during this period.

Mr. Scott Thieme replaced Mr. David Schweiger as the U.S. Alternate Regulation Representative on 5 May 2003.

The Board held conference calls on 23 and 27 May to discuss the hydropower emergency stemming from the 15 May breach of an earthen dam on the Dead River. The Canadian Member was not in attendance during the first teleconference, but he and U.S. Alternate Member (Roncoli) were in attendance during the second call.

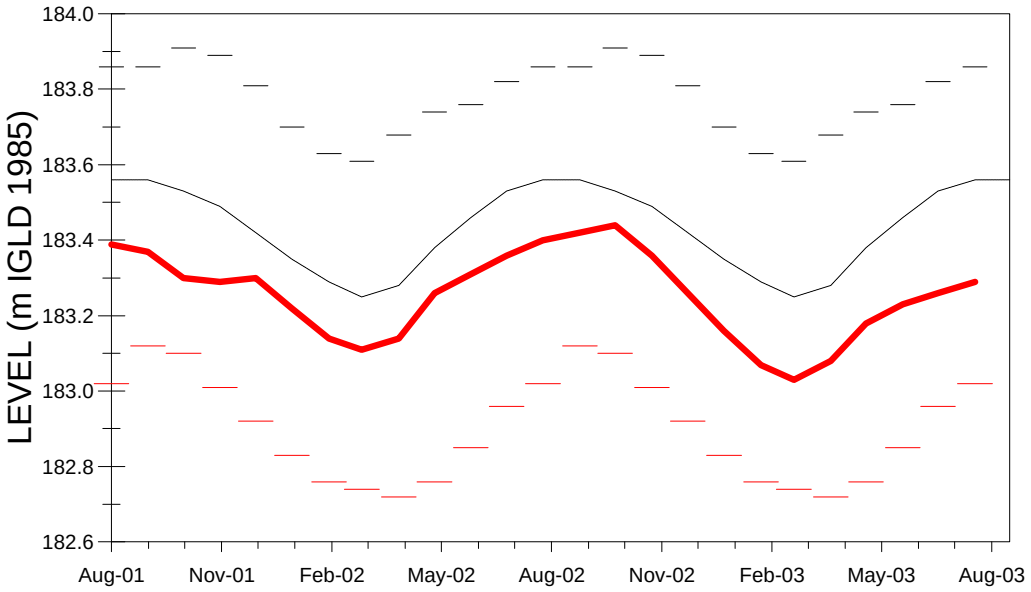
The Board held a meeting on 15 September in Niagara Falls, Ontario, with the Canadian Member and U.S. Alternate Member Johnston in attendance.

Respectfully submitted,

Col. Gary E. Johnston
Alternate Member for United States

Carr McLeod
Member for Canada

LAKE SUPERIOR MONTHLY WATER LEVELS



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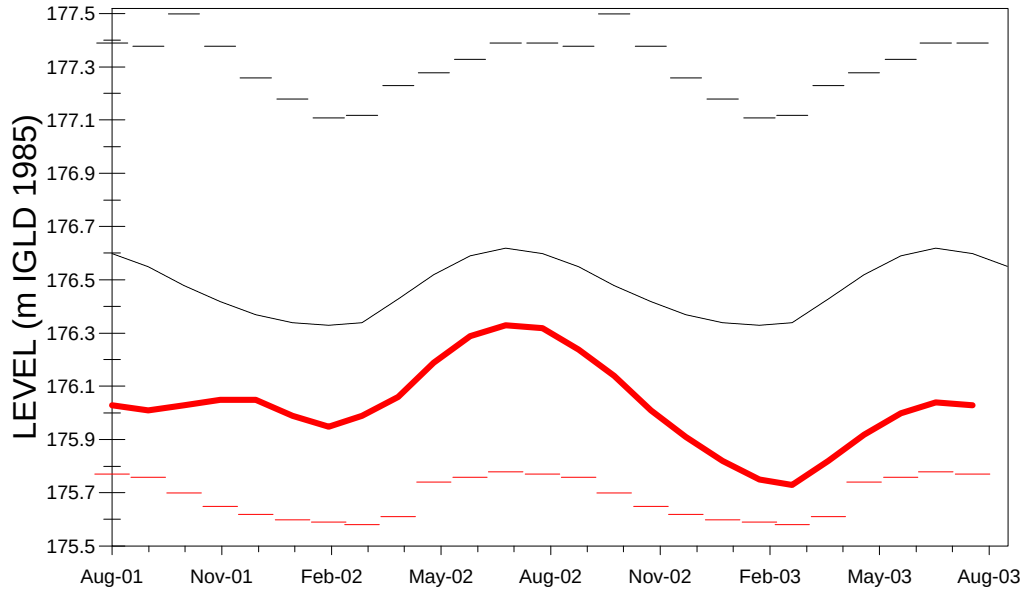
AVERAGE MAX MIN ACTUAL

LAKES MICHIGAN-HURON MONTHLY LEVELS



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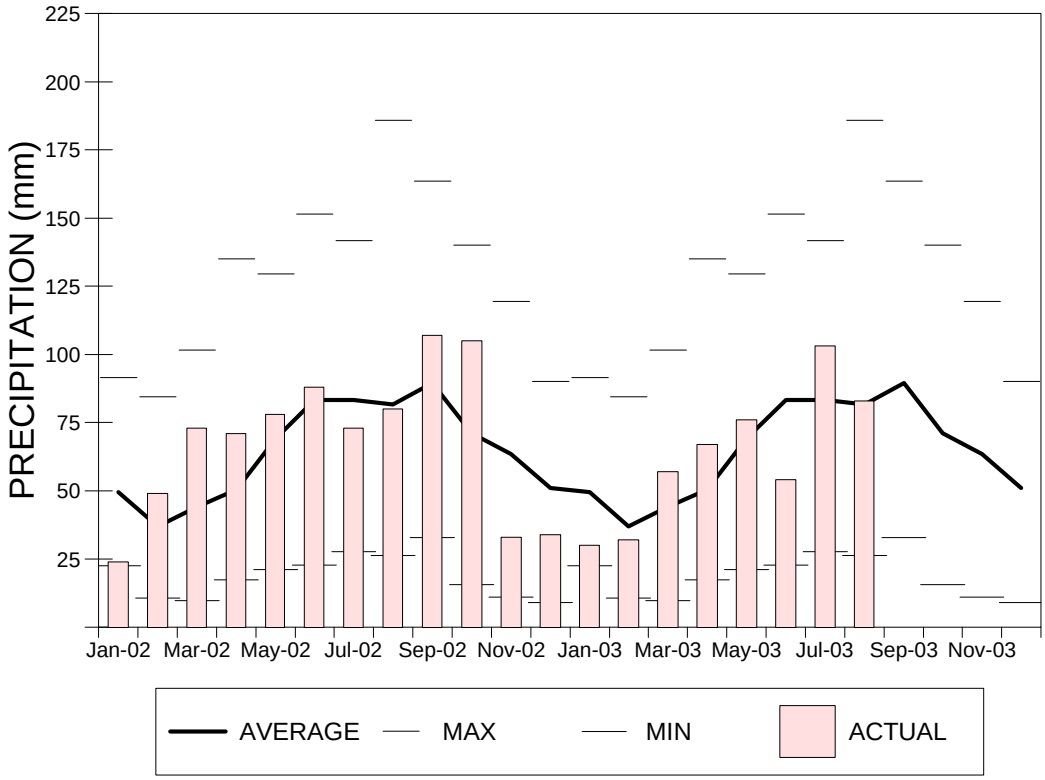
AVERAGE MAX MIN ACTUAL

Figure 1

LAKE SUPERIOR MONTHLY PRECIPITATION



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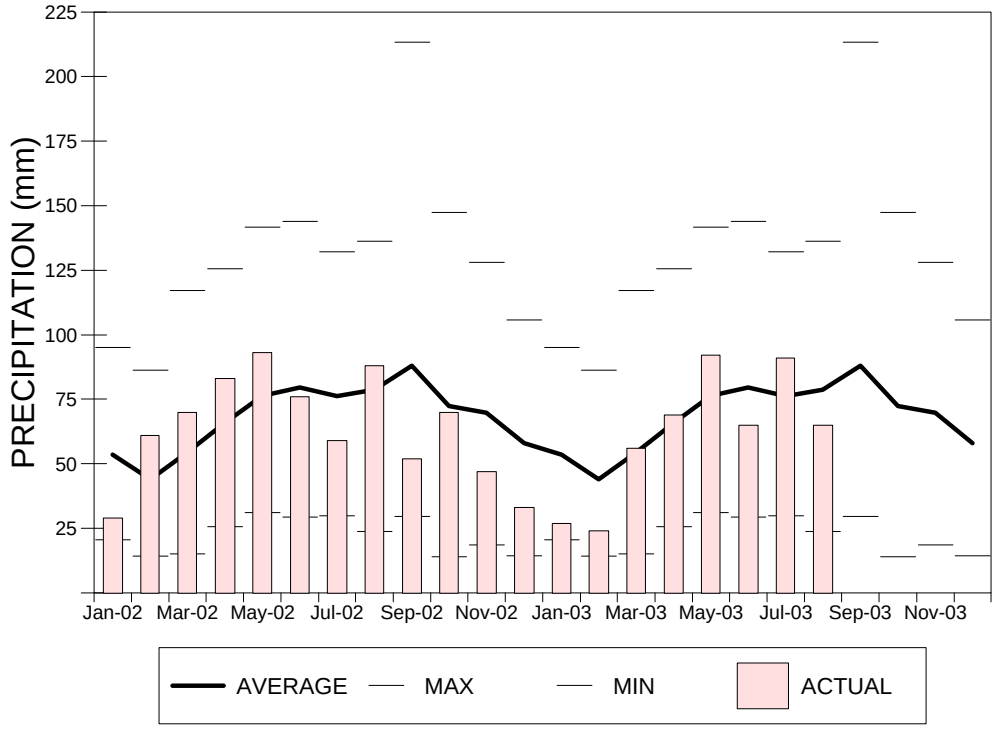
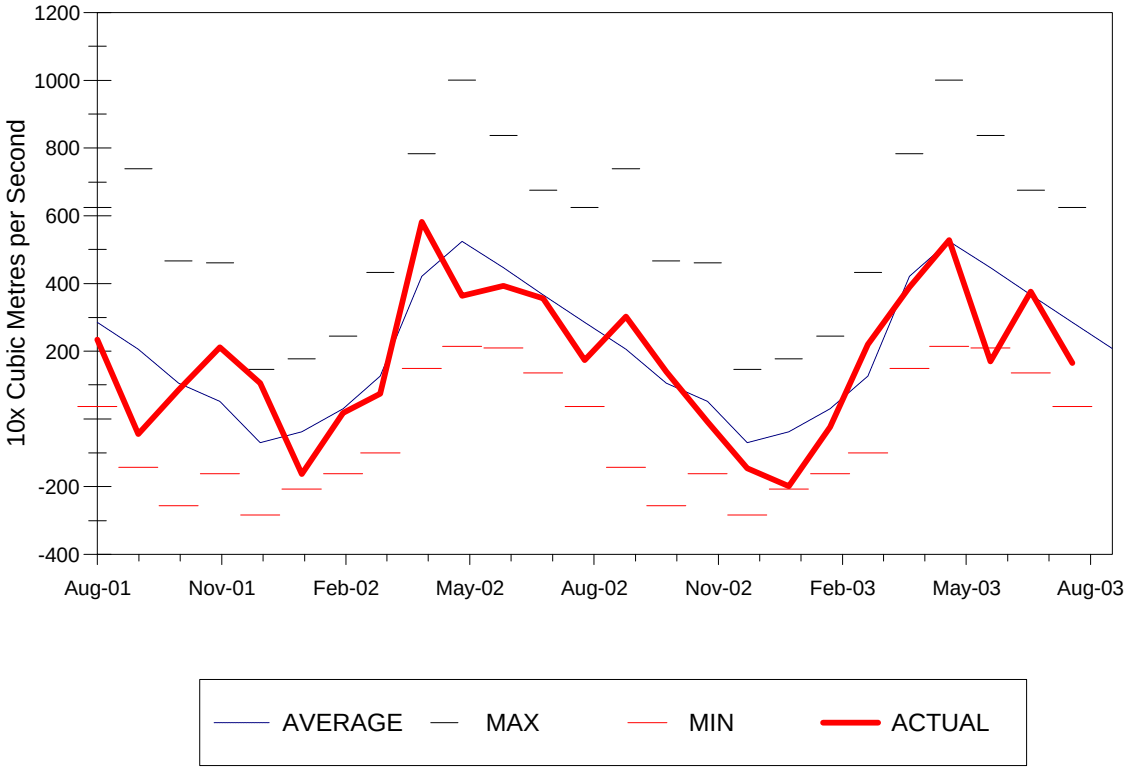


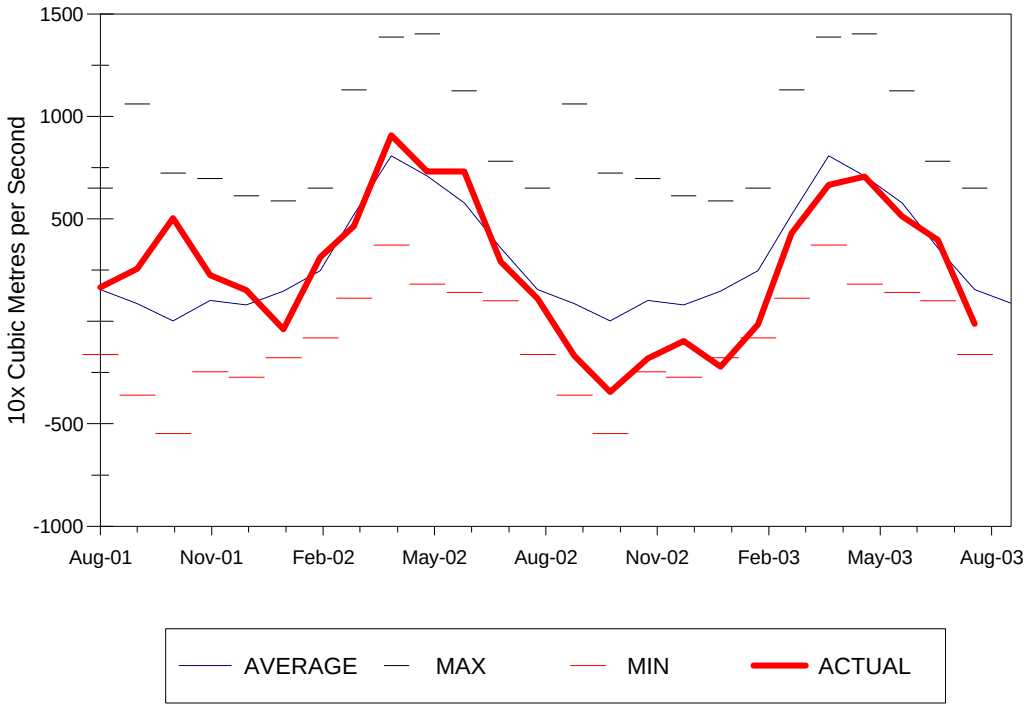
Average, maximum and minimum values based on period of record 1900-2002.

Figure 2

LAKE SUPERIOR
MONTHLY NET BASIN SUPPLIES



LAKES MICHIGAN-HURON
MONTHLY NET BASIN SUPPLIES



Average, maximum and minimum values based on coordinated period of record 1900-1989.

Figure 3

TABLE 1. 2002-2003 Lake Superior Hydrologic Factors

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded1		Difference From Average2		Monthly Mean Recorded		Exceedence Probability3	Monthly Mean Recorded		Percent of
	metres	feet	metres	feet	m3/s	tcfs	(%)	m3/s	tcfs	Average4
Apr-02	183.14	600.85	-0.14	-0.46	5820	206	14	1830	65	94
May-02	183.26	601.25	-0.12	-0.39	3650	129	82	2040	72	96
Jun-02	183.31	601.41	-0.15	-0.49	3930	139	61	2150	76	98
Jul-02	183.36	601.57	-0.17	-0.56	3570	126	50	2230	79	97
Aug-02	183.40	601.71	-0.16	-0.52	1740	61	82	2260	80	95
Sep-02	183.42	601.77	-0.14	-0.46	3030	107	23	2260	80	95
Oct-02	183.44	601.84	-0.09	-0.30	1410	50	39	2180	77	94
Nov-02	183.36	601.57	-0.13	-0.43	-80	-3	66	2220	78	98
Dec-02	183.26	601.25	-0.16	-0.52	-1450	-51	83	2090	74	101
Jan-03	183.16	600.92	-0.19	-0.62	-1980	-70	>99*	1880	66	97
Feb-03	183.07	600.62	-0.22	-0.72	-230	-8	74	1740	61	92
Mar-03	183.03	600.49	-0.22	-0.72	2210	78	22	1660	59	88
Apr-03	183.08	600.66	-0.20	-0.66	3900	138	56	1780	63	91
May-03	183.18	600.98	-0.20	-0.66	5280	186	48	1960	69	92
Jun-03	183.23	601.15	-0.23	-0.75	1710	60	98	2160	76	98
Jul-03	183.26	601.25	-0.27	-0.89	3760	133	44	2020	71	88
Aug-03	183.29	601.35	-0.27	-0.89	1650	58	84	2100	74	88

Notes: m3/s = cubic metres per second tcfs = 1000 cubic feet per second

1 Water Levels are a mean of five gauges on Lake Superior, IGLD 1985

2 Average levels are for period 1918-2002, based on a mean of five gauges. Differences computed as metres and then converted to feet.

3 Exceedence probabilities are based on the period 1900-1989.

4 Average flows are for the period 1900-1989.

* New record net basin supply.

TABLE 2. 2002-2003 Lakes Michigan-Huron Hydrologic Factors

Month	Levels				Net Basin Supplies			Outflows		
	Monthly Mean Recorded1		Difference From Average2		Monthly Mean Recorded		Exceedence Probability3	Monthly Mean Recorded		Percent of
	metres	feet	metres	feet	m3/s	tcfs	(%)	m3/s	tcfs	Average4
Apr-02	176.06	577.62	-0.37	-1.21	9080	321	32	4570	161	89
May-02	176.19	578.05	-0.33	-1.08	7320	259	43	4800	170	90
Jun-02	176.29	578.38	-0.30	-0.98	7330	259	18	4920	174	90
Jul-02	176.33	578.51	-0.29	-0.95	2910	103	65	5050	178	91
Aug-02	176.32	578.48	-0.28	-0.92	1120	40	58	5080	179	92
Sep-02	176.24	578.22	-0.31	-1.02	-1660	-59	90	4980	176	91
Oct-02	176.14	577.89	-0.34	-1.12	-3430	-121	98	4910	173	90
Nov-02	176.01	577.46	-0.41	-1.35	-1800	-64	94	4800	170	89
Dec-02	175.91	577.13	-0.46	-1.51	-960	-34	82	4610	163	89
Jan-03	175.82	576.84	-0.52	-1.71	-2200	-78	>99*	4060	143	91
Feb-03	175.75	576.61	-0.58	-1.90	-140	-5	98	3740	132	86
Mar-03	175.73	576.54	-0.61	-2.00	4310	152	63	4090	144	85
Apr-03	175.82	576.84	-0.61	-2.00	6680	236	71	4350	154	85
May-03	175.92	577.17	-0.60	-1.97	7070	250	47	4470	158	83
Jun-03	176.00	577.43	-0.59	-1.94	5130	181	62	4520	160	83
Jul-03	176.04	577.56	-0.58	-1.90	3990	141	37	4580	162	83
Aug-03	176.03	577.53	-0.57	-1.87	-110	-4	83	4580	162	83

Notes: m3/s = cubic metres per second tcfs = 1000 cubic feet per second

1 Water Levels are a mean of six gauges on Lakes Michigan-Huron, IGLD 1985

2 Average levels are for period 1918-2002, based on a mean of six gauges. Differences computed as metres and then converted to feet.

3 Exceedence probabilities are based on the period 1900-1989.

4 Average flows are for the period 1900-1989.

* New record net basin supply.

Table 3

INTERNATIONAL LAKE SUPERIOR BOARD OF CONTROL

MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOW

OUTFLOW IN m^3/s THROUGH

	POWER CANALS					NAVIGATION CANALS				DOMESTIC USAGE			FISHERY	TOTAL LAKE
YEAR AND MONTH	US GOVT HYDRO	EDISON SAULT EL. CO	US TOTAL	GREAT LAKES POWER	TOTAL POWER CANALS	UNITED STATES	CANADA	TOTAL NAV. CANALS	S.STE MARIE US+CAN	ALGOMA STEEL	ST MARYS PAPER	TOTAL DOM. USAGE	STE. MARY'S RAPIDS	SUPERIOR OUTFLOW m^3/s
2002														
JAN	408	549	957	951	1908	4.0	0.0	4	0.3	3.2	0.3	4	102	2018
FEB	408	485	893	897	1790	2.1	0.0	2	0.3	3.3	0.3	4	102	1898
MAR	405	450	855	854	1709	4.1	0.0	4	0.3	3.3	0.3	4	92	1809
APR	406	457	863	860	1723	10.3	0.0	10	0.3	3.4	0.3	4	95	1832
MAY	407	558	965	958	1923	12.5	0.7	13	0.4	3.5	0.3	4	102	2042
JUN	352	665	1017	1005	2022	15.0	2.0	17	0.4	3.4	0.3	4	103	2146
JUL	306	759	1065	1041	2106	15.8	2.6	18	0.4	3.5	0.3	4	104	2232
AUG	277	767	1044	1071	2115	15.7	2.5	18	0.4	3.6	0.3	4	125	2262
SEP	271	761	1032	1039	2071	14.1	1.8	16	0.4	3.5	0.3	4	170	2261
OCT	255	750	1005	1034	2039	12.2	0.6	13	0.3	3.2	0.3	4	125	2181
NOV	307	752	1059	1047	2106	11.2	0.0	11	0.3	3.4	0.3	4	99	2220
DEC	348	637	985	990	1975	10.4	0.0	10	0.3	3.5	0.3	4	98	2087
2003														
JAN	299	568	867	906	1773	5.0	0.0	5	0.4	3.4	0.3	4	95	1877
FEB	325	492	817	827	1644	2.1	0.0	2	0.4	3.2	0.3	4	94	1744
MAR	333	445	778	786	1564	3.2	0.0	3	0.5	3.4	0.3	4	94	1665
APR	350	485	835	833	1668	9.8	0.0	10	0.4	3.3	0.3	4	94	1776
MAY	340	602	942	907	1849	12.2	0.7	13	0.4	3.2	0.3	4	96	1962
JUN	349	692	1041	1004	2045	14.2	2.0	16	0.4	3.1	0.3	4	97	2162
JUL	335	613	948	948	1896	15.0	2.6	18	0.4	3.0	0.3	4	98	2016
AUG	352	629	981	997	1978	14.5	2.4	17	0.4	3.2	0.3	4	98	2097

NOTE: POWER CANALS COLUMNS INCLUDE FLOWS THROUGH POWER PLANTS AND SPILLWAYS

Table 4

INTERNATIONAL LAKE SUPERIOR BOARD OF CONTROL

MONTHLY DISTRIBUTION OF LAKE SUPERIOR OUTFLOW

	OUTFLOW IN CFS THROUGH													
	POWER CANALS					NAVIGATION CANALS				DOMESTIC USAGE			FISHERY	TOTAL LAKE
YEAR AND MONTH	US GOVT HYDRO	EDISON SAULT EL. CO	US TOTAL	GREAT LAKES POWER	TOTAL POWER CANALS	UNITED STATES	CANADA	TOTAL NAV. CANALS	S.STE MARIE US+CAN	ALGOMA STEEL	ST MARYS PAPER	TOTAL DOM. USAGE	STE. MARY'S RAPIDS	SUPERIOR OUTFLOW CFS
2002														
JAN	14400	19400	33800	33600	67400	141	0	141	11	113	11	135	3600	71300
FEB	14400	17100	31500	31700	63200	74	0	74	11	117	11	139	3600	67000
MAR	14300	15900	30200	30200	60400	145	0	145	11	117	11	139	3250	63900
APR	14300	16100	30400	30400	60800	364	0	364	11	120	11	142	3350	64700
MAY	14400	19700	34100	33800	67900	441	25	466	14	124	11	149	3600	72100
JUN	12400	23500	35900	35500	71400	530	71	601	14	120	11	145	3640	75800
JUL	10800	26800	37600	36800	74400	558	92	650	14	124	11	149	3670	78900
AUG	9780	27100	36900	37800	74700	554	88	642	14	127	11	152	4410	79900
SEP	9570	26900	36500	36700	73200	498	64	562	14	124	11	149	6000	79900
OCT	9010	26500	35500	36500	72000	431	21	452	11	113	11	135	4410	77000
NOV	10800	26600	37400	37000	74400	396	0	396	11	120	11	142	3500	78400
DEC	12300	22500	34800	35000	69800	367	0	367	11	124	11	146	3460	73800
2003														
JAN	10600	20100	30700	32000	62700	177	0	177	14	120	11	145	3350	66400
FEB	11500	17400	28900	29200	58100	74	0	74	14	113	11	138	3320	61600
MAR	11800	15700	27500	27800	55300	113	0	113	18	120	11	149	3320	58900
APR	12400	17100	29500	29400	58900	346	0	346	14	117	11	142	3320	62700
MAY	12000	21300	33300	32000	65300	431	25	456	14	113	11	138	3390	69300
JUN	12300	24400	36700	35500	72200	501	71	572	14	109	11	134	3430	76300
JUL	11800	21600	33400	33500	66900	530	92	622	14	106	11	131	3460	71100
AUG	12400	22200	34600	35200	69800	512	85	597	14	113	11	138	3460	74000

NOTE: POWER CANALS COLUMNS INCLUDE FLOWS THROUGH POWER PLANTS AND SPILLWAYS
NOTE: Flows for individual users were originally coordinated in m3/s, and are converted here to U.S. customary units (cfs) and rounded to 3 significant figures. Total flow for each category and total Lake Superior flow in this table are computed from the individual flows in cfs.